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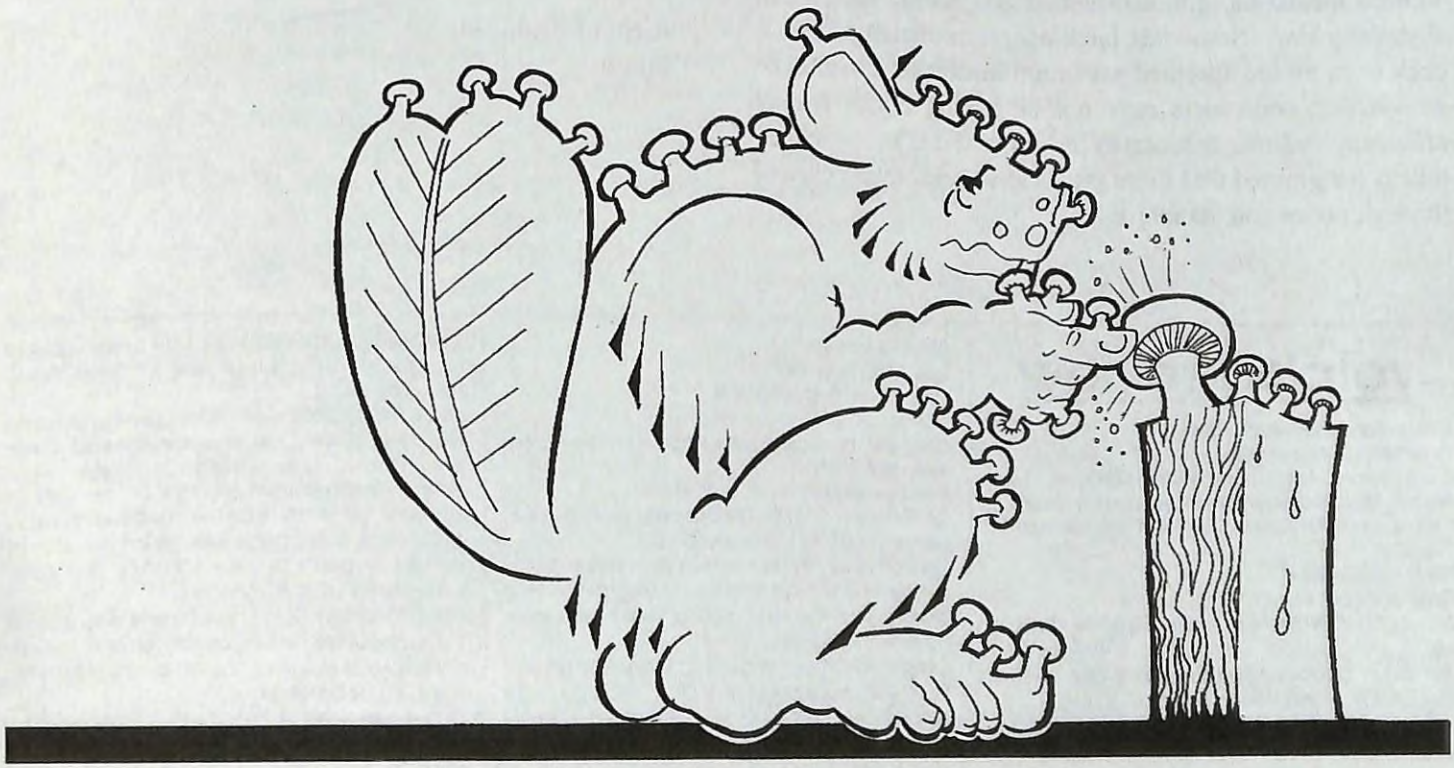
Moulds in Houses



From the Editor . .

The proposed reductions in insulation requirements to the Ontario Building Code have stirred considerable debate. More importantly, it raises the issue of what housing standards should be and how they are set. How far can the mythical marketplace take them, before some form of codified set of rules are mandated?

The housing industry is on very slippery ground: how can it advocate a reduction of standards while at the same time calling itself the champion for consumers? It gets away with this contradiction simply because there are no defined housing consumer groups. Like it or not, we have to recognize that consumers often make assumptions about the products they are purchasing. The principal assumption is that their interests are being well looked after through the various levels of codes and regulatory bodies.

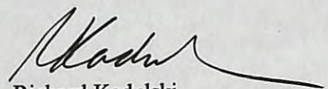
When I mention to prospective home owners that BC had no minimum insulation requirements until 1993, and that building an uninsulated house was possible, their jaws drop. They take it for granted that standards have existed for some time. Normal construction practices did meet minimum norms, but it was purely voluntary. Few houses were built without insulation, although actual levels may have been abysmally low. Some fast buck operators managed to cut back even on the accepted minimum insulation levels. The reason that consumers may not be asking about energy efficiency features as much as they once did is because they take it for granted that these issues have been taken care of through codes and standards.

We forget that consumers don't always ask all the right questions simply because they don't always know what to ask for. They assume certain standards and features (required by code or not) are going to be there.

The housing and development industry already suffers from a poor reputation. Too many unqualified operators are maximizing profits with little regard for their customers. (That is why there is a push to new home warranties).

If industry pushes for lower minimum standards, especially when a strong economic and environmental case can be made for the higher standards, it will only reinforce the industry's image of not really caring for the consumer.

Minimum requirements should be reasonable, justifiable and enforceable. Just as we say the house is a system, more than the sum of its individual parts, let's look beyond the 2x4's on the construction site when we discuss standards. It is going to have a bigger impact on the community as a whole.



Richard Kadulski,
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Mould in Homes

That homes affect the health of residents is not just a New Age philosophy. We have hard evidence that there is a relationship between health and the condition of the built environment.

One tell tale sign is the person who feels much better when away from a given building environment. It is not necessarily a reaction to the boss or co-workers, or an unhappy home relationship. Some problem sources will be construction materials, some will be furnishings, and others will be biological organisms associated with the construction and use of the building. The biggest culprit is moisture - or rather the result of moisture: mould growth.

Mould is not just that innocent stuff growing on the cheese at the back of the fridge, or down in the cold, wet cellar. Mould exposure can lead to certain types of disease, beyond an obvious allergic effect. Some mould species are very toxic, and are known to have caused deaths. If we reduce the incidence of moisture and mould problems, can we reduce health problems? The answer is yes.

Most moulds generally require four things to grow rapidly: a suitable surface to grow on, suitable temperatures, nourishment and a relatively constant source of water. The only way to control mould is to control the moisture source.

Why do some houses have so many moulds and others so few? Is it a simple matter of envelope performance, of occupant behaviour, or a combination of these?

Health and Welfare Canada, Agriculture Canada and Canada Mortgage and Housing Corporation (CMHC) have jointly sponsored several research projects examining the health effects of mould and other biological contamination in houses. A major CMHC-sponsored project laid the foundation for much of our understanding of the relationship between the built environment and health. A detailed data base has been developed, largely based on investigations done in Wallaceburg, Ontario. The information collected makes up one of the most extensive and detailed information bases in the world on the relationship between house construction, household operation, biological contamination, indoor air contaminants and subjective and objective measures of health.

The Wallaceburg study measured the biologically-active contaminants in about 400 houses and explored the health of occupants through health questionnaires and medical examinations. The building evaluation focused on factors related to mould growth, and specifically mould growth that could be related to condensation forming on surfaces in the winter. All building inspection and medical testing was done during the winter, when people spend the maximum amount of time bottled up inside a closed house.

The main objectives of the study were:
- why some houses produce so much more biologically active material than others
- what exposure conditions can contribute or make moisture/mould problems worse
- whether or not high exposure to moulds is reflected in measurable allergic reactions or disease in the residents
- which changes in house construction techniques and operation could alleviate most problems.

Data collected included:
- house properties based on a site inspection and an interview with the occupants
- measured air tightness, temperatures and humidity levels, and testing to learn the potential for combustion product spillage from the furnace and hot water heater
- detailed inspection of areas that had been wetted or exhibited mould growth
- continuous monitoring of temperature, humidity and carbon dioxide levels in a child's bedroom for one week
- sampling for Volatile Organic Compounds (VOC) in the living room
- a medical questionnaire and brief physical examination of the entire family by a nurse
- blood samples and nasal secretions
- swab samples of visible mould (for species identification) and a dust sample from the living area
- levels of biological contamination were assessed by air sampling.

A more detailed analysis of house details and health data was done on a group of 59 houses. Thirty-nine "bad" houses with high measures of biologically active contamination and 20 "good"

with a low level were compared. Simulations were done to predict the potential for condensation in winter. Efforts were made to keep the study as "blind" as possible. Field inspection personnel, nurses and analysis laboratories were not told if the buildings or samples they were looking at were from the "good" or "bad" sample sets.

Elements that could confuse the analysis, such as smoking, the level of VOCs or CO_2 in the indoor air or possibly-related biologically contamination including dust mite and pet antigen levels in household dust were taken into account.

Source:
Mouldy Houses: Why They Are & Why We Care
Prepared by: Morrison Hershfield Consulting Engineers for Canada Mortgage and Housing.

What was found?

There was a direct link between measurements of mould growth and objective measures of health. If there is moisture in the house, especially in the basement, there will be mould. The relationship is complex, and very individual to a specific house.

The ventilation level in the houses was not a significant factor in the level of biological contamination, but the presence of local moisture sources is a much more significant factor. In other words, it is the moisture generated by and through the house, more than occupant activities, that contributes to mould growth. That is why it is important to do all possible to keep all areas of the house, including basements, warm and dry.

Many moisture and mould problems appeared related to soil contact (i.e., basement and foundation elements).

Mould growth from condensation on windows is common, even in "good" houses. ☼

Basement Moulds

Moulds may at first seem harmless growths, an indication of sloppy housekeeping. However, they have a negative impact on the occupants' health. Recent studies have pointed out that mould is a serious problem lurking in our homes. Some are highly toxic and several deaths have been attributed to moulds. As builders, we must give our customers a safe, healthy environment.

Moisture introduced by the house through leaks and damp basements is far more serious than household activities.

How common are basement moulds?

During the winter and early spring of 1995, CMHC looked at 405 houses in the Ottawa area. The study consisted of a brief basement inspection and homeowner questionnaire to find out how common moisture problems are in finished basements.

Does the average person recognize the problem? In the study about 75% of the homeowners said they had no moisture problems in their basements. However, a site inspection found that half the houses had clear signs of moisture in the basement (such as spalling concrete, efflorescence and moulds) and 35% of basements had either musty, mouldy or earthy odours.

Are typical "finished" basements contributing to mould growth and thus worsening the indoor air quality? Basements are often moisture-troubled parts of houses and "finished" basements in particular are of concern because they may be hiding the mould and moisture problems. Attempts were made to learn if common construction details could be the cause of moisture troubles or mouldy basement walls. The presence of moulds in finished basements relates more to continuing moisture sources rather than with specific basement finishing techniques.

Mould samples were only taken from the surfaces affected. Some harmful moulds found warrant remedial measures be taken for health reasons. Room air sampling was not conducted as it was determined that moulds found in the walls could get into the room air freely if the wall cavities were not airtight.

Most basements had wood framing, glass fibre insulation and drywall interior finish. Only five houses had expanded polystyrene insulation; three of these had stud framing over the polystyrene insulation. Only seven basements had moisture barriers for the full depth below grade.

The common factor in all mouldy basements was the presence of moisture sources or repeated or prolonged wetting incidents. The durability of the finishes and the thermal performance are being affected by the moisture problems.

General Observations

Except for plumbing leaks and high interior relative humidity, all moisture sources were from exterior sources, through foundation cracks, window well leaks, ineffective dampproofing and perimeter drainage, poor grading and downspouts at foundation walls. Interior sources were from clothes dryers and basement bathroom fans that were not vented properly to the outside and high summer relative humidity.

Typical basement wall assemblies are usually not airtight and have considerable air movement. The insulated wall cavities are usually open to the room at the top of the finished wall or at the edges of finished and unfinished basement portions. In a few cases, recurring leaks from foundation cracks or window wells did not cause prolonged wetting or mould growth. These leaks did occur in portions of basements that were only finished and insulated for the top half and the water was allowed to drain out.

The presence of moulds behind the baseboard is a good indicator of mould problems in the insulated cavity, as baseboards can slow the drying of wet interior finishes. Moulds were found between the baseboards and the interior finish in nine houses.

The two houses with full height insulated basements (as required by the Ontario building code at the time) were mould-free. One of these had an air gap membrane as dampproofing/drainage layer on the exterior of the foundation.

In some basements, mould was present where the drywall was in contact with the floor slab while areas with drywall not in contact were mould free. This happens because the drywall in contact with the floor slab can wick moisture from the floor slab. Small spills or minor water leakage can result in mould growth that would not have occurred if the drywall not been in contact with the concrete floor. The heat loss from the drywall to the cooler floor slab can also cool the drywall's surface temperature to below the dew point so that it creates a moist surface on which moulds can grow.

A polyethylene air/vapour barrier directly behind the drywall can prevent moisture trouble in the cavity from showing up on the room side through the drywall.

Isolated wetting events can cause mould problems if the moisture is trapped and materials remain soaked for a long time.

Moisture Sources:
- lack of effective dampproofing on foundation walls
- lack of effective perimeter drains
- poor soil grading around the house
- lack of eavestroughs
- lack of proper water diversion from eavestroughs
- downspouts moving water against foundations
- foundation cracks
- window well flooding
- sump pump failure in high water table areas.

Source:
Moulds in Finished Basements Prepared for: Canada Mortgage and Housing Corporation by: Scanada Consultants Limited.

Moulds considered toxigenic were found in 15 of the 405 houses and although one of the mouldy basements had no toxigenic moulds, it had one pathogenic mould.

Aspergillus versicolor, a dangerous mould, was found most often (12 houses). *Stachybotrys atra*, another very dangerous mould was detected in five (5) houses. Spores of these moulds do not remain viable for long in dry conditions.

The relatively high incidence of the sample was biased toward houses with moisture troubled basements.

toxigenic: an organism that produces toxic compounds that have properties that can severely harm humans

pathogenic: organism causing or capable of causing disease.

Ozone Generators

by Richard Kadulski

.... ozone is an irritant that can cause coughs, chest discomfort, and irritation of the nose, throat and trachea. Ozone has detrimental effects on the lung functions of healthy people.

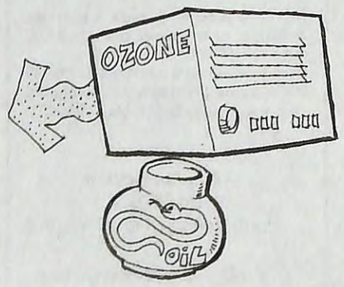
Marketers are heavily promoting ozone generators (or ozonators) as "air purifiers." Ozone generators are machines that generate ozone by circulating room air through an electrically charged plate. The plate converts the oxygen into ozone, which is then moved into the room by a fan in the unit.

Ozone is not a stable compound, and naturally dissipates on average within 30 minutes. Its toxic properties are used as a disinfectant for water and in swimming pools. It is important to recognize that the concentration of ozone is location dependent, being highest closest to the source of ozone. Its distribution through a space will depend on the air movement and the ozone gradients in the space and also the presence of certain substances with which ozone reacts more easily than others.

Unfortunately, ozone is an irritant that can cause coughs, chest discomfort, and irritation of the nose, throat and trachea. Ozone has detrimental effects on the lung functions of healthy people at concentrations above 0.30 ppm. It can also affect the lung functions of healthy people engaged in strenuous physical activity at concentrations lower than 0.30 ppm. Clearly defined limits have not been agreed on, but Health Canada indoor exposure guidelines suggest the acceptable short term exposure limit is 0.12 ppm over one hour. [The average outdoor concentration in Canadian urban centres is 0.015 ppm, while typical indoor levels are less than 0.02 ppm.]

ozone can produce more irritating compounds than were there before

The dissipation of ozone involves a chemical reaction between the ozone and other chemicals present in the environment. The result of this interaction can in fact produce more irritating compounds than were there before, such as formaldehyde, benzaldehyde, benzoic acid and acetophenone. These products are caused by the reaction of ozone with styrene, meaning after ozone is introduced, the total VOC concentration is increased up to four times.



Ozone is not good at any concentration. The marketing, however, plays on the fact that ozone is naturally occurring out doors, with slightly higher levels at higher alpine elevations in the mountains. As alpine air is cleaner, the leap of faith is made that it is the ozone that is the reason. Of course, this ignores the issue of urban pollution, including ozone generated due to urban traffic (and it is this ozone that is a contributor to smog problems).

Then, there is the classic snake oil sales pitch - "we've sold so many units without a complaint, how can it be bad?" For example, Alpine Industries claims it is approaching 1,000,000 customers over the past 10 years, without a single consumer health complaint. However, there are many other factors in the home or office environment, so it is difficult to pinpoint any single culprit unless it is especially bad. Despite the sales pitch to the contrary, outdoor air (even in congested urban areas) is better than indoor air, so ventilation is a better solution to indoor air quality issues.

The FTC Ruling

The marketing practices of ozonator salespeople have been less than honest. The US Federal Trade Commission (FTC) investigated, and laid charges in 1995 that unsubstantiated claims were being made about the ability of the ozone generators to clean air of various indoor air pollutants and to prevent or relieve allergies, asthma and other conditions. The companies did not have adequate evidence to back up their claims.

The Commission's action, which is binding on the respondents, was against Living Air Corporation of Minnesota and its sister company, Alpine Industries Inc., the marketers of the Living Air Model XL15 and other ozone generators; and Quantum Electronics Corporation, based in Rhode Island, marketers of the Panda 200 and other ozone generators.

Under the order, the respondents are required, in connection with marketing any air cleaning products, to have competent and reliable scientific evidence to support claims that:

- the product eliminates or clears specified chemicals, gases, mould, mildew, bacteria, or dust from the environment
- the use of ozone is more effective than other air cleaners in cleaning or purifying indoor air
- the product does not create harmful by-products
- the product prevents or provides relief from allergies, asthma, and other specified conditions.

Further, any representation about the efficacy, performance or health-related benefits of any air cleaning product must be supported by competent and reliable evidence that, when appropriate, must be scientific evidence.

Is there a use for ozonators?

In fact, there are some cases where using an ozonator may be appropriate. Ozone can be used to clean up a badly contaminated room or house, after an incident such as a fire or flood. However, it should be used in an unoccupied condition - never when occupied! ☼

Building Science Course

The building envelope is a key part of the buildings we construct. It separates us from the elements. We have been building houses for many centuries, so one would think that we know how to do it properly. However, it seems that may not be the case today, as we seem to have trouble learning from our predecessors.

The problem may be that, in the past, the learning was done on the job as most trades were qualified through a long apprenticeship period. The situation today has become more complex as, insisting on quick and low cost construction, we use plenty of unskilled labour and take too many shortcuts. Perhaps more importantly, we use products that did not exist even twenty or thirty years ago, in designs often ill-suited to our climate. To top it off, not enough participants in the industry have an adequate understanding of building science. If a builder or designer knows the forces that act on buildings, then evaluating the details and new materials to assess how well they will work in a given situation should be possible.

The knowledge and understanding of fundamental building science is increasingly more important today, yet the subject is not taught at many schools, and continuing education opportunities are not widely available or accessible for those in the field. The consequences of the poor knowledge in the field were highlighted in the study we reviewed in the last issue (Keeping the Water out: Building Envelope Performance, Solplan Review January 1997). The study was started because of the massive failures happening in the construction of new dwellings in the Vancouver area.

Building science (the understanding of the physics of buildings), has been developed and promoted by the National Research Council since the early 1960's. Their early publications are still some of the best sources of information on the subject. Publications such as the *Canadian Building Digests*, the NRC's *Building Science Seminars*, and the book *Building Science for a Cold Climate* are recognized around the world, and still represent the state of the art.

To deal with the gap in ongoing educational opportunities, a new tool has been developed. *Building Science and the Building Envelope*, is a self study course that has been developed for practitioners, teachers, and students of building science. The author, Gustav Handegord, is a former researcher with the National Research Council, and also teacher of building science at the University of Toronto, Carleton University, and the Southern Alberta Institute of Technology.

The course is intended to develop an understanding of building science principles and the assessment and prediction of building envelope performance. It is laid out in twelve lessons, each with a series of exercises. The course gives a comprehensive coverage of the subject that starts with the basics of air and moisture content, goes to a discussion of the outdoor and indoor environments, the temperature gradient in the envelope, vapour pressure gradients, materials and their moisture content, and exterior cladding rain wetting and moisture penetration.

It is not a course for everyone, and it is very technical and theoretical. Emphasis is placed on the effects of the monthly and seasonal variations in the climate that characterise the different regions in Canada, as well as on the influence of internal separations and mechanical systems on building envelope performance. The intent is to encourage a more conceptual design attitude by engineers and a more technically based approach to design by architects. Anyone with a need to understand building science for design or project review should try to at least review this material. That would include architects, engineers, technicians, building officials, suppliers, and also builders.

Copies of the twelve session course, available in a loose-leaf binder, are available for $60.00 plus shipping. The course can be treated as a correspondence course, with a review and commentary on responses to the exercises for $240.

For information:
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Building Paper Performance

by Richard Kadulski

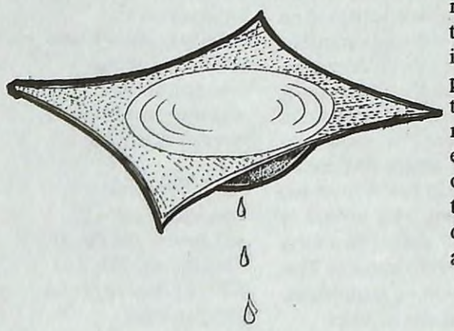
While we don't often realize it, we rely on the building paper behind exterior siding materials to keep the water out. In recent years, the development of new high tech materials has meant that they are also being put to work as a significant element of the air barrier of a house. Products such as Tyvek, Typar, and Air-Guard use the air sealing properties of the material as a major sales feature. The large, 9 feet wide sheets reduce the number of joints between sheets, making this a realistic possibility when properly applied.

The materials are made of plastic resins. They are designed to allow water vapour through, but to resist water and air flow. Do they really work?

Evidence is beginning to mount that they only partially work. Properly applied and sealed, they do provide resistance to air flow, creating an effective air barrier, allowing water vapour to pass through. However, they do not necessarily stop water. Anecdotal evidence shows that there are applications where materials such as Tyvek and Typar are failing due to moisture penetration.

How can this be possible? By design, these materials have a certain amount of porosity, but they are resistant to the flow of bulk water. The surface tension of water droplets keeps the water from passing through the material. However, when the water has impurities in it, the surface tension is reduced and the water droplets can penetrate the material.

What kinds of compounds get dissolved in the water? Soaps and other synthetic compounds added to stucco mixes, and oils in wood siding, are two major contaminants that affect the water. This is significant, as most exterior finish materials are not waterproof. In some conditions water penetrates the siding, so the building paper must provide the resistance to moisture that gets through the exterior. How much water penetrates the siding will depend on the nature of the material, the climatic conditions, and the drying potential of the materials.



Tyvek, Typar, and 60 minute asphalt sheathing paper all allowed water to penetrate

Often there will be periods during which the water will be driven inwards, even after the rain stops. For example, when the sun warms the surface of the siding after a rain, the vapour pressure may drive moisture into the wall, rather than out.

The standard test for sheathing paper only tests the vapour permeance of the material, not the water permeance. We did an informal test with samples of Tyvek, Typar, and a 60 minute asphalt sheathing paper.

Two samples of each were prepared - the paper was supported in a cupped shape, so it could hold a bit of water. Two batches of water were prepared - one was a clean one, the second was "contaminated." The clean water was cold tap water, while the "contaminated" water was tap water with a small amount of regular dish detergent (2-3 drops in about ½ liter of water). A thimble full of water was placed on each sample.

With clean water, there was no water penetration, but all allowed water penetration if the water contained impurities. We found that all the materials were moist on the back side within minutes of exposure to contaminated water. The Typar allowed all the contaminated water through in about 15 minutes, the Tyvek took about 2 hours, and the 60 minute building paper took much longer.

Is this a fair test? Our test is only an approximation of how the material will work on the job site. Remember that most product tests are done in an artificial laboratory environment. The water vapour permeance test, for example, uses distilled water.

In a wet climate, such as the west or east coast, how a construction assembly is detailed is very important. Good detailing, with a rain screen, will reduce or eliminate the potential of waterpenetration. If there is no rain screen, water can be driven against the weather barrier, and as it invariably contains contaminants that have leached out of the siding, the water can migrate right through the sheathing membrane. This does not even consider the zealous home owner who power washes his siding from time to time - guaranteed to drive moisture and soap into the wall! ☼

Technical Research Committee News

Envirohome Program Continues

The Envirohome program, a marketing opportunity for new home builders to promote environmentally responsible, R-2000 energy efficient homes, has been renewed for 1997. Any merchant builder is eligible to take advantage of this opportunity. The technical requirements focus on R-2000 standards, with all environmental options.

For details, contact John Broniek at the CHBA national office.

Garage Wall Gas Leakage

Attached garages represent special challenges in construction. The garage is usually considered an important attachment to the house, not only used only for storing vehicles, but also as a buffer space between exterior and interior. Because of the many contaminant and combustion products that may be present in the garage, codes require a vapour tight separation between the garage and the house. Evidence from the US indicates that there may be more spillage of gases from the garage into the house than is desired. A research study is being undertaken to investigate what the experience is in Canadian housing. This may provide information that may require changes to the way we build attached garages.

Regulatory Obstacles to Innovative Housing Technologies

Have you encountered problems with the acceptance of new products or new technologies? Many industry innovators have reported great frustration and delays when attempting to implement new technologies, even in a demonstration or leading edge innovative housing project. Many of these obstacles come from the regulatory process, either through the relevant building codes, product standards, or planning and zoning regulations. Innovative buildings, almost by definition, are likely to violate code requirements or zoning regulations.

A study presently underway for CMHC is documenting problems encountered, to provide information on the types of problems likely to be encountered and the types of solutions that have worked in various cases. If you have encountered any problems, let the TRC know and they will pass on the information to the study team.

HOT-2000 Windows Version

HOT-2000 is the reference tool for determining compliance with the R-2000 Program technical standards. A version (AUDIT 2000) is being finalized for use in home audits for renovation work. Both of these are DOS based software. As a result of greater use of Windows-based computing, a Windows version of HOT-2000 is being finalized. It should be ready later this spring. It is being developed for Windows 95, but a Windows 3.1 version should be available later in the year.

Advanced Houses Follow Up

Final reports from the various advanced houses are completed. An assessment of advanced house technologies has been made, and work is underway to encourage the commercialization of successful new technologies. Two of the new technologies that have emerged are high performance windows, and integrated mechanical systems. Advanced windows are now widely available through many window suppliers. This is one industry that can be said to have matured.

Integrated mechanical systems are a new area that still needs more product development. All advanced houses had a variety of combination systems. In all cases, the system had to be site assembled, using various components presently on the market, often involving more than one trade to install. Having a single package would enhance system performance, reduce installation complexity, and provide a more cost effective system. An industry meeting has already been held, and work is ongoing to develop prototype advanced integrated systems. It is expected that prototype packaged systems will be available for field testing later this year.

Ross Monsour Leaves CHBA

For the past several years Ross Monsour has been a valuable resource person for the Technical Research Committee. He has decided not to renew his contract, and will be leaving CHBA effective March 31. We wish him much success in his new position as the Marketing Director with the Ready Mix Concrete Association of Ontario.

Canadian Home Builders' Association

The Technical Research Committee (TRC) is the industry's forum for the exchange of information on research and development in the housing sector.

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Potential Impacts of Residential Retrofits

The worldwide drive to reduce mankind's impact on the global environment has to be tackled at many levels. Energy consumption by buildings is a significant factor in greenhouse gas emissions (such as CO_2). By their design and detailing new buildings can be made energy efficient when they are built. That has been the motivation behind new home initiatives such as energy codes and energy efficient new home programs.

Unfortunately, the existing stock of buildings is not affected by the standards. If we are to tackle the global environmental challenge meaningfully, so that we can move toward sustainable housing development, the existing housing stock must be tackled. One way to do that is to take action to meet the goal of the Toronto Protocol, which is to improve the energy efficiency of existing housing so that greenhouse gases are reduced to 50% of 1988 levels by the year 2030. This is a goal that is technically feasible, but will be a challenge to attain.

Eighty four percent of all Canadian housing stock today was built before 1981. This means that it is at an age where renovations will be done. Each house, at some time, becomes a candidate for new siding, interior finishes, windows, etc. That is why more attention is being given to retrofit programs - it is one way to deal with existing housing.

What actions are taken, or which programs are encouraged, must be evaluated in terms of their total impact on the environment. To reduce greenhouse gasses, the mere activity of renovation and upgrading, the labour and materials used, uses energy - in other words, it's going to take a certain amount of energy just to produce, deliver and install the new insulation, siding, windows, mechanical equipment, and whatever. As a result, the greenhouse gas emission reductions may not be as dramatic as first anticipated. It does not mean that energy improvements are ignored or put aside, but that we need to make a realistic assessment of the benefits of various upgrades.

A study by SAR Engineering evaluated some of these issues, and offers interesting insights. The embodied energy and embodied pollutants in the retrofits themselves are repaid by the reduction in operating energy and pollutants within a year or so. In other words, the energy used to retrofit houses is a good investment toward future energy savings and benefiting the environment.

However, to achieve the ambitious goals of 50% CO_2 reductions (and energy consumption) by 2030, whole house retrofits must be done, including envelope upgrades, mechanical systems improvements, and appliance replacements. Simulations done to assess the impact of various scenarios give us an interesting view of how complex the picture is.

An aggressive whole house retrofit that brings a house to a performance level about 30% better than the proposed National Energy Code will reduce operating CO_2 emissions to half of 1989 levels by the year 2030. However, when you factor the effect of new construction and demolitions of existing housing, the total emissions reduction is only about 12% of 1988 levels. This happens because the total number of houses, although they are more efficient, is much greater.

If the upgrade level is not as aggressive - intended only to meet the NECH requirements, CO_2 emissions will drop to 61% of 1988, and when other factors are added in, the total reduction is only 4% of 1988 levels. If the upgrade is more modest, meeting typical 1989 construction practices, the net emissions reductions (considering the greater number of housing units) will increase by 9% of 1988 levels.

In all these scenarios, the retrofits assumed work for which the effective cost of energy saved was less than $12 per GJ (this is the approximate consumer cost of electricity and oil today - natural gas costs about $7 per GJ). These energy price assumptions are conservative and only looked at cost-effective upgrades based on today's knowledge and materials options. If there are significant changes in energy prices, and new material developments, there may be other options available for tomorrow's renovators that are not considered viable today.

When considering retrofit options, regional variations also have to be considered. Reductions in hydro-generated electricity for appliances and lights in gas or oil heated houses could actually result in higher CO_2 emissions, even through total energy use may be lower, because those appliances are contributing to the space heating of the house.

To achieve the high penetration level, meeting superior performance levels, will require a massive undertaking, involving consumer education, builder training and perhaps consumer incentives. However, the objectives are cost effective even now, before environmental fuel price multipliers (or "carbon taxes") are considered. It's only a matter of will. ☼

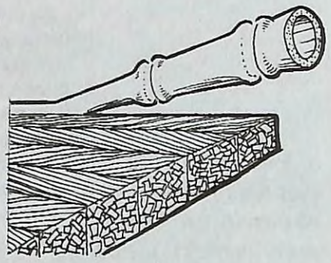
R-2000

For information on the R-2000 Program, contact your local program office, or call 1-800-387-2000

Bamboo Plank Flooring

For a snow bound country like Canada, bamboo sounds like an exotic tropical plant. Bamboo is a fast growing grass (many west coast gardeners will attest to this as this is the only area in Canada in which bamboo thrives). Yet the fibre of some of bamboo species is harder than many hardwoods, comparable to oak in terms of hardness and durability. As a result, it can be used for many applications for which hardwood can be used.

One interesting application is its use as flooring. The strength of the material makes it an excellent choice for high traffic residential and commercial floor applications. The reed like pore structure of bamboo limits swelling and provides exceptional dimensional stability. Bamboo has only a straight grain and is not subject to the ripping and chipping problems common to the short grain alignment of many woods. Long strips are split from the hollow stalks and then flattened, kiln dried and glue laminated together under high pressure to produce a flat plank. Planks are shaped, planed and sanded as for wood flooring. For the budget conscious, it offers an attractive wood floor that is about 30 to 40% cheaper most other first grade hardwood flooring.



There is also a positive environmental angle to bamboo: it takes only three to five years to grow bamboo so an acre of bamboo can provide more flooring than an acre of trees. Cutting bamboo shoots does not destroy the roots and fresh new sprouts grow in their place (this is why gardeners are cautious about bamboo!). It has a dense root mass that helps prevent soil erosion and provides a viable crop opportunity for hills where other crops cannot be grown. The species used for flooring is sustainably harvested from select groves in southern China and is not eaten by pandas.

K & M Bamboo Products Inc. in Scarborough is distributing a bamboo flooring that is prefinished with 6 or more coats of 100% solid UV cured acrylic urethane.

Information:
K & M Bamboo Products Inc. 63 Silver Star Blvd., Unit E2, Scarborough, ON M1V 5E5
Tel: 416-297-5465
Fax: 416-293-3127

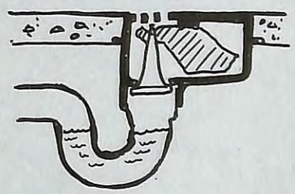
Basement Floor Drains

Basement floor drains are not an exciting product. You have to have them, but that's about it. There are problems with the floor drains: they can dry out, as they are not often used, and when the trap is dry it allows sewer gases into the house, as the basement is generally at a negative pressure in relation to the rest of the house.

The standard way to avoid this problem is to install trap primers that continuously put a drip of water into the drain. This requires extra plumbing and wastes more water than is necessary. Field experience shows that they generally fail after a short while. However, most regulatory authorities still insist the trap primer be installed.

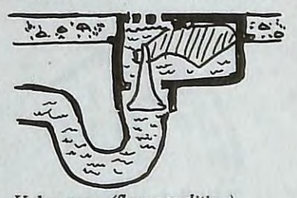
An alternative has been developed by the folks at Dranjer Corp. It is a floor drain with a counter balanced valve/seal assembly that acts as a 'sewer gas check valve' when the conventional P-trap dries out. It has a float that under no-flow conditions acts as a weight to keep the valve closed and keeps the trap from drying out and prevents sewer gases from entering the house.

When water enters the drain, the float creates a positive opening that is essential to establish normal water flows, and it also ensures a smooth flow of water when the drain is in active use. The float and seal assembly are easily removed to give access to the trap. The all plastic construction avoids problems with corrosion. Cost to the trade is expected to be about $35.



Valve closed (normal condition)

Engineering tests in Winnipeg have shown that the unit can meet CSA performance requirements. Even if the trap dries out, the valve blocks 75% or more of sewer gas entry when compared with a conventional floor drain. Field trials are being conducted in residential locations across Canada including CMHC's Healthy Houses in Toronto.



Valve open (flow condition)

While this product solves many technical problems encountered in the field, there is great reluctance by authorities to accept it. (Who said that if you invented a better mouse trap the world would come knocking on your door?)

Information:
Dranjer Corporation
9-10 McGillivray Place
Winnipeg, MB R3T 1N4
Tel: 202-474-0451

The Toronto Healthy House

a downtown house that requires no electricity, water or sewer connections

A three-bedroom family home built on a small downtown lot in Metro Toronto, independent of city water, sewer, hydro and natural gas. Primitive? A hardship? These are just a few of the many features that make Toronto Healthy House a clean, comfortable, environmentally responsible haven in the heart of the city, showing a viable approach to providing housing where services are not available.

This 1,700 square foot house is based on the winning entry of the 1992 CMHC Healthy Housing Design Competition. The four-storey, semi-detached house is located on an infill lot in the Riverdale area of Toronto, a downtown neighbourhood. Because the house requires no electricity, water or sewer connections, building on a lot that would normally be too expensive to develop was possible.

It may appear revolutionary, but is actually based on ideas that are not new or high-tech. It displays not tomorrow's ideas, but housing choices that are do-able and affordable today. Many of these ideas can be applied to both new and renovated homes.

It is designed to promote occupant health, enhance energy efficiency, improve the efficient use of natural resources, and encourage environmental responsibility.

There is a research component to this house as well, so some features are still prototypes. Others may seem a bit far out and expensive, but as more applications of the technology are built, economies of scale will reduce costs.

Off-grid houses do not necessarily require hours of labour for upkeep. Everything in the house is easy to maintain and available today. All the components in the house have proven track records, but many have not been used together before in one house as an integrated system.

The idea for this house recognizes that the cost of providing conventional services on certain types of city land such as along Sparkhall Avenue, site of the Toronto Healthy House, is prohibitively expensive for conventional construction. By introducing environmentally friendly features that make the house independent of city services, the construction costs are increased compared with a conventional house. However, these increased costs are offset by the lower cost of unserviced land, so the final price of this house is comparable to others in the neighbourhood.

HEALTHY HOUSING
PLAN ON IT!

Special Features of the Toronto Healthy House

The house is totally self-sufficient, not dependent on the city's infrastructure. The central location also takes advantage of existing transportation services and builds the tax base to support community infrastructures such as schools.

The house depends on rainfall for its water supply and recycles much of the water used. Water consumption in this house is reduced to one-tenth of that in a typical household by using low-volume toilets, low-flow shower heads and aerator faucets. Water consumption is expected to be 120 litres per day for a family of three. Normal consumption for a Canadian family of three is 1,050 litres, or 350 litres per person. The water purification system mimics the natural path that rain follows when it passes through the ground to a spring.

Solar panels generate electric energy that can be stored for later use. A co-generator provides back-up power and heat. Energy efficiency is achieved through high levels of insulation in the airtight building envelope, and high performance windows.

Materials used to furnish and decorate the house are selected for their low emission properties to improve indoor air quality.

Space Heating and Cooling

The Heating System takes advantage of outside conditions to provide comfortable interior temperatures year round. Conventional energy use is considered a last resort.

In winter:

Large energy-efficient south-facing windows and solar panels capture sunlight, while the thermal mass of the house - concrete floors and walls - makes efficient use of solar energy. The house uses about one-tenth of the energy needed to heat a conventional house so that sunlight can provide most of the energy for space heating needs. Heating bills are expected to be less than $80 per year.

Triple-glazed, high performance windows are strategically placed to use solar gain and reduce heat loss in winter.

Solar radiant floors have been specifically designed to retain solar heat during the day and radiate it to the interior at night. The floors are concrete poured in a light corrugated steel pan with reinforcing. The steel pan surface becomes the ceiling for the room below. The floor absorbs excess heat during the day and releases heat during the night when it is needed. Heat radiates not just from the floors, but from the ceilings also. If required, warm water can be circulated through pipes embedded in the concrete floors to supplement direct solar heat gains.

In summer:

Heat gain is controlled by window shading and moderated air flow. Trees and ivy trellises provide shade in summer, but do not block the winter sunlight.

Efficient electrical appliances reduce the internal heat gain so there is less need for air conditioning. Excess heat is radiated to the ground surrounding the house.

The waste water system provides evaporative cooling through a heat exchanger.

Water System:

This is perhaps the most revolutionary feature of this house as it combines several systems into a single urban house. It also was the most difficult obstacle in the approval process. The house is self-sufficient, depending entirely on rain and snow for its water supply.

Potable water is rainwater. The purification system mimics the natural path that rain follows when it passes through the ground to a spring. Rainwater is collected in a 20,000 L concrete cistern that should be sufficient for the household's potable needs for five months if there is no rainfall.

The potable and reclaimed water systems are independent of each other. This ensures that only purified rainwater is being consumed in the sinks and dishwasher while reclaimed water is only used for secondary purposes. The reclaimed water supplies the tubs, showers, toilets and washing machine. Water is reclaimed and recycled three to five times.

Because the house depends on rainfall for its water supply, there would not be enough fresh water available for a conventional septic system. A conventional septic system with an absorption trench leaching system on soil using conservation measures (low flow fixtures and appliances) requires more than 76.8 m^2 for disposal. However, only 11 m^2 were available for disposal of waste water. By recycling 600 litres of the 720 litres of water available for consumption per day, the volume of disposal water is only 120 litres per day and the disposal area required is 1.69 m^2.

The system used was developed by Dr. Craig Jowett at the University of Waterloo and is now sold as the Waterloo Biofilter™. It is an efficient waste water treatment system that can digest biological waste in a small space. System cost for residential applications is expected to be about $10,000.

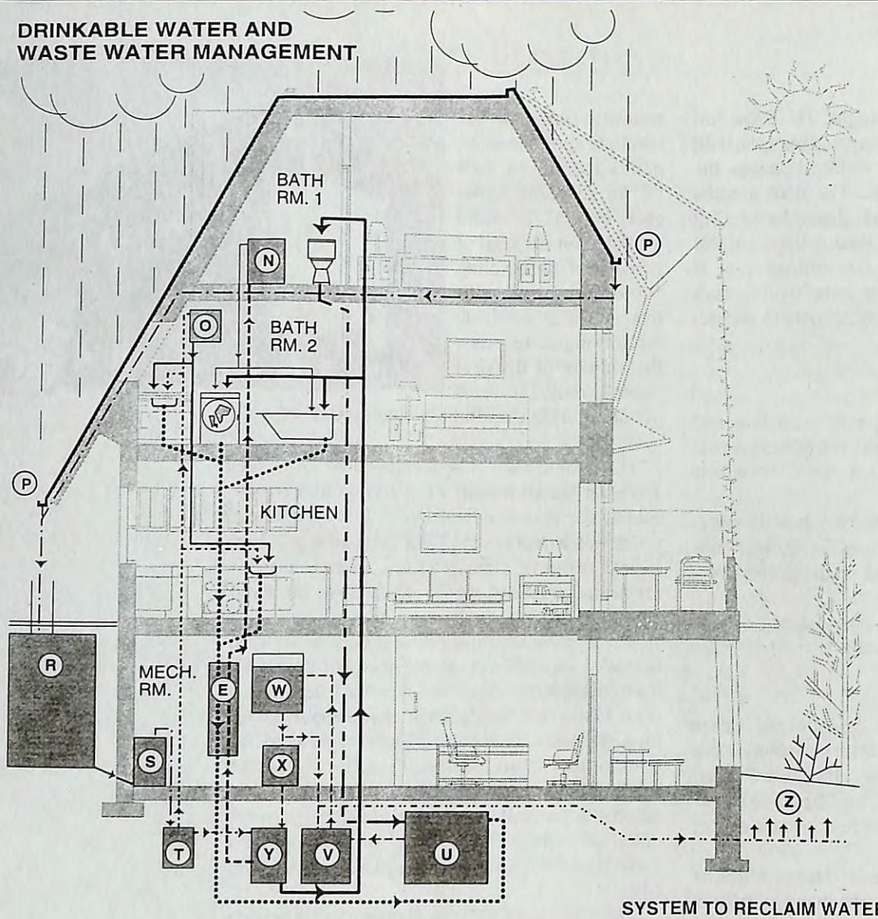
The multi-stage filtration unit does not rely on the use of chemicals. A layered gravel filter, graded from coarse at the bottom to fine at the top, removes most suspended solids, then the effluent passes through a slow sand filter. This is a fine sand bed that develops a thin, biologically-active layer at the sand surface, which becomes very effective in adsorbing particulates, bacteria and cysts. Most dissolved organic matter is also consumed. Finally, the water passes through an activated carbon filter.

The slow sand filter is cleaned by automatic back flushing about once a month and the carbon needs to be replaced about once a year.

As a final barrier to pathogens, the effluent from the filter is passed twice through an ultraviolet disinfection unit. The ultraviolet unit is equipped with a sensor that will automatically shut down the supply if there is not enough disinfection due to a burnt-out or fouled lamp. Treated water is discharged to a 1200 L storage tank and is then pumped into the reclaimed water system.

The Electrical System

Generating electricity using photovoltaic (PV) panels is not new. Improvements in materials and equipment technology and the greatly reduced requirements of energy efficient housing have made



DRINKABLE WATER SYSTEM

(P) **Eaves troughs**
Collect roof rainwater, which passes through filter screens and then to cistern.

(R) **Rainwater cistern**
20,000 litres (normally sufficient for 6 months consumption).

(S) **Combination filter**
The rainwater passes through a combination roughing, slow sand, and carbon filter, and then through an ultra violet light disinfection unit before being stored for drinking.

(T) **Drinkable-cold-water tank** [600 L]
Supplies kitchen and bathroom sinks; overflow to reclaimed-cold-water tank.

(O) **Drinkable-hot-water tank** [140 L]
Supplies kitchen and bathroom sinks.

WASTE WATER SYSTEM

(E) Grey water heat exchanger

SYSTEM TO RECLAIM WATER

(U) **Septic tank** [3,600 L] (under driveway)
Anaerobic bacteria transforms waste water for treatment by the Waterloo Biofilter.™

(V) **Recirculation tank** [2,000 L] (under floor)
Provides de-nitrification in an aerobic environment.

(W) **Waterloo Biofilter ™**
Aerobic bacteria transforms the effluent to a semi-treated condition.

(X) **Twin combination filters**
Water passes through two combination roughing, slow sand and carbon filters.

RECLAIMED WATER
Water is recycled 3 to 5 times.

(Y) **Reclaimed-cold-water tank** [1,200 L]
Supplies tub, laundry, showers and toilets.

(N) **Reclaimed-hot-water tank** [450 L]
Supplies tub, showers and laundry.

(Z) **GARDEN IRRIGATION**
Site gravel pack disperses overflow water under front garden (about 120 litres per day.)

solar applications increasingly appropriate, especially in off-grid locations.

Eight PV panels are mounted on a metal structure attached to the roof. The panels act as an awning for the south facing windows on the fourth floor of the house, and they also can generate up to 2.3 kW of power on sunny days. The electricity is stored in batteries in the basement utility room. A 4-kW inverter changes direct current from the 48 volt battery to household alternating current at 120 volts.

Toronto has many grey days between November and April. However, there is usually enough solar energy to provide enough power to meet 75% of the household needs. It is expected that on the worst day of winter the house may consume 9 to 12 kWh of electric energy over a 24 hour period. However, on a typical day with five to eight hours of sunlight, it is possible to generate a total of 10 to 15 kWh of energy. If there is no sun at all, the batteries can provide about four days of energy before they need recharging.

Overall, this house will use about 3,600 kWh of energy in one year, 900 of which will be provided by a back-up generator that burns a standard fuel such as gasohol.

Reducing the electrical demands was a prime consideration in choosing such items as the bathroom fans, household appliances, circulating pumps, fans and even the light bulbs. One appliance commonly found in houses is missing: the clothes dryer has been replaced with a drying closet. The heat recovery ventilator supplies warm air to dry the clothes hanging in the drying closet and exhausts the moist air to the outside. Drying time is about two hours, compared with the usual forty-five minutes in a traditional dryer, but the cost is almost zero and the clothes last longer with such gentle treatment.

The compressor and condenser of the custom-built refrigerator in this house are placed outside the house to improve efficiency in winter, reduce heat gain in summer and help decrease noise levels inside the house. Even an energy efficient refrigerator would still consume one-quarter of the PV panel output on a sunny winter day. These modifications achieve a 40% reduction in energy requirements.

The Design Team

Toronto architect Martin Liefhebber Architect Inc. is responsible for the overall idea and house design.

Reid Jones Christofferson Ltd., Engineers designed the structure.

Dr. Tim Myles of the Urban Entomology Lab at the University of Toronto designed a nontoxic termite barrier.

Per Drewes, alternative energy specialist with Ontario Hydro, designed the electrical system.

Doug Hart of Watershed Energy Systems designed the solar heating, cooling and thermal energy systems.

The potable water system design was developed by RAL Engineering Ltd. and Creative Communities with assistance from the Technical University of Nova Scotia. The waste water system was designed by Waterloo Biofilter Systems Inc., Creative Communities, and RAL Engineering Ltd. The integration of the systems was supervised by Blue Heron Environmental Technology and adapted for the house by Creative Communities and Martin Liefhebber.

Creative Communities Research Inc., purchased the land and built the house. Rolf Paloheimo, the owner of Creative Communities, will live in the house with his wife and child. The house will be monitored for a one-year period.

The Toronto Healthy House (not wheelchair accessible) is open to visitors until late spring 1997. Viewing is by appointment only. For information, or to book a tour call:
416-218-3343

Windows Industry Acquisitions

Winnipeg-based Willmar Windows, one of Canada's largest window and door manufacturers, recently acquired the assets of Cascade Windows of Chilliwack, B.C. The new combined window and door manufacturing business will operate as Willmar Windows. Production of PVC windows is planned to be shifted to Chilliwack to service B.C. customers.

Willmar now employs about 725 people in its manufacturing facilities in Winnipeg, Edmonton, Gananoque and Chilliwack.

Soon after Willmar's acquisition was revealed, Jeld-Wen Canada, a diversified millwork company with special emphases on the window and door industry, announced that it has taken over the Willmar group of companies. Jeld-Wen Canada is a wholly-owned subsidiary of Jeld-Wen Inc., a privately-owned company headquartered in Klamath Falls, Oregon. It is also one of North America's largest window manufacturing conglomerates. Other members of the group include Pozzi Windows, Norco, and Wenco. They have moved aggressively into Canada, having recently purchased two other wood and PVC window companies in Canada: Quebec-based Donat Flamand, and Toronto based United Windows.

Build a Better Kitsap Program

A Builders' Green Building Program

The Home Builders Association of Kitsap County unveiled the "Build a Better Kitsap," program that recognizes builders and remodellers for incorporating environmentally-friendly practices and products in their projects. The program is the first "green" building recognition program in the State of Washington.

The program began with the idea that there's a cost-effective way to build safe, quality homes and preserve the environment at the same time. It is a market-based solution to address environmental concerns. Build a Better Kitsap provides builder and remodeller members with both the incentive and the resource materials they need to use environmentally-friendly techniques and products and provide greater value for their customers.

It is one of only two green building rating programs in the USA conceived, developed, and administered by a local building trade association. (The other is in the Metro Denver Area). There are two other green building rating programs in the USA, but both were a product of local government initiatives. These are the Green Builder Program in Austin, Texas, and the Colorado Green Program, which is a state-initiated spin-off of the Austin program.

Kitsap Country is a lightly populated (235,000 people), largely rural county across Puget Sound from Seattle. The largest city is Bremerton, with a population of 35,000.

The program is a self-certification process, where participating builders and remodellers rate their project by selecting from a list of more than 85 options described in an easy-to-update three-ring binder handbook. Each option is assigned a certain number of points that, when totalled, determine whether the project is a one-star, two-star, or three-star project. The amount of points an option represents depends on level of difficulty, cost, and other criteria set by the members designing the program. All program options were screened for do-ability. For example, products that aren't available in the county today were not included.

Points toward star ratings are grouped into 8 types of environmentally-friendly actions:

- **Compliance** with Washington Energy Code, Ventilation/Indoor Air Quality code, and Water Use Efficiency standards. (but there are no points attached to meeting the codes)
- **Proper Site Treatment:** common-sense site protection techniques and take advantage of site features.
- **Reduce/Reuse/Recycle:** 28 options that help reduce job-site waste.
- **Resource-Efficient Products:** using materials manufactured in a way that reduces the use of natural resources.
- **Energy Efficiency:** improvements to design and detailing that go beyond code minimums
- **Good Air Quality and Health:** elements that improve indoor air quality before, during, and after construction
- **Proper Hazardous Waste Management:** reduce hazardous waste and dispose of it properly
- **Environmentally-Responsible Home Ownership:** incorporating features that help a more environmentally responsible life style, such as recycling centres and composting bins.

A one-star rating is something most builders could attain today, without too much effort and very little additional cost, if any.

Associate members (for example, suppliers, subcontractors and real estate agents), can also participate in the program as "Participating Partners." ☼

Information:
Home Builders Association of Kitsap County
2521 Auto Center Way
Bremerton, WA 98312
Tel: (360) 479-5778
Fax: (360) 479-0313

Changing Weather Patterns Will Require Construction Changes

From the February report of Saskatchewan Provincial Technical Research Committee to the Technical Research Committee.

The weather is getting more violent. Insurance companies are warning of more disasters, and insurance executives are not known for extreme statements! The number and severity of freak summer storms on the prairie provinces are increasing, with a 1996 loss estimated at $180 million (not including crop losses). The Insurance Bureau of Canada reported that July 1996 was the worst month they have ever had.

Most of the increase in violent storms is being blamed on climate change (aka global warming). Hurricanes, tornadoes and floods are becoming more frequent and causing more damage and deaths. If the weather continues to test the buildings in which we live, we need to look more closely at how we design, build and anchor our buildings.

Insurance companies are urging all countries to reduce greenhouse gases that scientists believe are affecting temperature and rainfall. Canada is a signatory to the Memorandum of Agreement negotiated recently in Brazil to limit $C0_2$ emissions. Unfortunately, we are not doing very well toward achieving our goals.

Canadian Wood-Frame House Construction

$25.95 plus taxes, handling and shipping. You can find the book in bookstores, or directly from CMHC (tel.: 1-800-668-2642). .

When I was a student of architecture (more years ago than I care to admit), and first encountering the need for practical how-to information on wood frame construction, I came across a newly published book: Canadian Wood-Frame House Construction. First published in 1967, the slim book quickly became the reference book on Canadian housing techniques, for students and professionals alike.

Other books explain frame construction fundamentals and provide plenty of construction tips. Some are excellent, providing lots of practical information, but only CMHC's book does it in a crisp, no nonsense, manner. Bedtime reading it's not, but packed full of information it is.

A newly revised edition of this Canadian classic has just been issued. It's been expanded to 300 pages, but it's still a compact, sturdy coil-bound book (it stays flat when open - a handy feature if you want to refer to the book on the job site). New features include a recognition that house construction still operates in the archaic imperial measuring system, so all dimensions are provided in both imperial and metric. The illustrations have been revised, and "planning ahead" and "checking back" notes have been added where appropriate. Each chapter also identifies related publications.

Keeping in mind the house as a system, this edition incorporates the latest building science knowledge about house construction. A useful addition are the healthy housing insights presented throughout the book to enable users to apply key healthy housing principles: occupant health, energy efficiency, resource efficiency, environmental responsibility, and affordability.

Letters to the Editor

Re: Ontario Building Code Changes

I have been an avid reader of Solplan Review for almost 4 years now. I am the Deputy Chief Building Official, Supervisor in the Regional Municipality of Haldimand-Norfolk in Ontario.

I must tell you that your articles in Solplan Review have increased my knowledge of building sciences and are a good supplement to the education provided by the Ontario Ministry of Housing and Ontario Building Officials Association.

Your January 1997 article "the Ontario Building Code changes: a Dissenting Voice" hit the nail on the head for me. I would like permission to republish this article in the Ontario Building Officials Journal, with credit.

Bob Allison, Field Supervisor
Building & By-Law Enforcement Division
Townsend, ON

Re: "Home Inspection Industry" (Solplan Review, January 1997)

As you note, there are North America wide and regional home inspection associations. There is also a Canada wide association - the Canadian Association of Home inspectors, with chapters in BC, the Prairies (AB, SK & MB), Ontario, Quebec and the Maritimes. They have in place a minimum Standards of Practice and a Code of Ethics by which all members must abide. While they may vary from province to province, there are exams that assess the individual's knowledge of all aspects of home inspection. In BC and Ontario there is also a professional designation (Registered Home Inspector) granted by the provincial government to those two chapters. Along with that goes the responsibility to respond to complaints about members.

Like municipal inspectors, those involved with CAHI through the local chapters also "have some technical background (it may be engineering, architecture, trades training or even recognized field experience.)" This does not mean that home inspectors can or will want to do municipal code inspections if that profession is ever privatized. All these inspectors - municipal inspectors and home inspectors - share a common body of knowledge but practice different professions.

In an unregulated profession, there are many people who come and go, to the detriment of the profession. Some of those who stay in the profession are not interested in high standards and ethical conduct. CAHI has worked hard to set the Standard for all home inspectors to follow.

Bill Clayton, AScT,
Registered Home Inspector
Surrey, BC

The EcoBuyer Catalogue

The Environmental Choice Program and its EcoLogo™ label was launched a number of years ago, but it is only recently that the number of products with environmental standards has been expanded. The voluntary third party certification program gives consumers a visible means of identifying products that have a lower environmental impact.

Product compliance requirements vary depending on the nature of the materials, but generally are set so that only a portion of the products in a given category can meet the criteria. Standards are updated as technology and materials require.

Ecologo™ Products and Services in the Building, Grounds and Construction Category now include: Compost Toilets; Driveway Sealer; Fire Door Retrofit Kit; Gypsum Wallboard; Safety Fence/Snow Fence; Thermal Insulation; Turf Management System (Organic); Water Conserving Retrofit Devices; Water Conserving Showerheads; Water Well Rehabilitation Service.

Finally a catalogue that lists all certified products has been published. It groups products and services into eleven major categories to make buying decisions faster and easier. Each category includes:

- an index of all products that appear in the section
- an introduction with a list of the products and services
- an overview of the environmental standards
- key environmental benefits realized by meeting certification criteria;
- the names of companies and their products or services complete with a description and contact information.

The free EcoBuyer Catalogue is published by
TerraChoice Environmental Services Inc.
300 - 2197 Riverside Dr.
Ottawa, ON K1H 7X3
Tel: (613) 247-1900
Fax: (613) 247-2228
E-Mail: ecoinfo@TerraChoice.ca
http:// www.TerraChoice.ca/ ecologo.htm

Power Smart Inc. Dissolved

On January 13, 1997, the shareholders of Power Smart Inc. (a consortium of energy utilities that jointly promoted the efficient use of energy) decided to dissolve the organization. The decision was precipitated when Hydro Quebec and Ontario Hydro decided to withdraw.

Exclusive ownership of the Power Smart name and marks will continue to reside with BC Hydro.

This may seem like a ho-hum utility announcement. But for anyone seriously concerned about the environment and energy efficiency issues, this has ominous overtones for the future of energy efficiency programs. When BC Hydro launched the Power Smart program, it was unique. It was a demand-side management program. Within a broad umbrella there were many discrete program components. Each was targeted at selected groups, be they residential, commercial or industrial.

The success of Power Smart was aided by the saturation marketing within BC. Other utilities saw the merits of pooling ideas and resources and joined in.

Rather than focus on a few grandiose demonstrations, there was real encouragement for marketplace activities, many with a sunset clause. Because utilities have credibility, the marketing initiative included product endorsements that encourage more energy efficient product development.

With the scaling back of the programs, will we now see a return to the bad old days when utilities were actually promoting the use of energy, regardless the environmental impacts?

Coming Events

April 16 & 17, 1997
B.C. Chapter of ASHRAE bi-annual Trade Show products and services in heating, ventilating, air conditioning, refrigeration, mechanical and energy management.
Italian Cultural Centre
3075 Slocan St., Vancouver, B.C.
Tel: (604) 929-3245
Fax (604) 929-0543.

June 5-7, 1997
IMPLEMENTING SUSTAINABLE ENERGY IN A CHANGING WORLD
The Solar Energy Society of Canada Inc. 1997 annual conference Vancouver, BC Technical conference that brings together advocates and experts of sustainable energy systems. Associated events include training workshops on solar (Photovoltaic) electricity installation, solar domestic water heating, solar pool heating, and passive solar design. For program information:
Tel: 613-523-0974
Fax: 613-736-8938
e-mail: sesci@sympatico.ca

July 8-11, 1997
1997 ACEEE Summer Study on Energy Efficiency in Industry How Industry will procure energy efficiency services in the 21st century
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